THE WILSON BULLETIN

A QUARTERLY MAGAZINE OF ORNITHOLOGY

Published by the Wilson Ornithological Club

Vol. XLII DECEMBER, 1930 No. 4

Vol. XXXVII (New Series) Whole Number 153

THE BARRO COLORADO LABORATORY AS A STATION FOR ORNITHOLOGICAL RESEARCH

BY JOSSELYN VAN TYNE

In view of the increasing interest now being shown by American ornithologists in detailed studies of the life histories of birds it seems desirable to call attention to the tremendous opportunity for such work on neotropical species and the splendid facilities for field studies now afforded by the Barro Colorado Biological Station in the Panama Canal Zone.

Perhaps few realize how little is known of tropical American birds. Their taxonomy is now fairly well understood, but, I suppose, less is known of their habits than was known of North American birds in the days of Audubon's explorations ninety years ago. This situation is due to the real and fancied dangers and difficulties usually attendant upon field work in the tropics. But with the establishment of the Barro Colorado laboratory in 1924 these were largely eliminated from work in that region.

When the great Gatun Lake was formed in the construction of the Panama Canal there were created a number of islands. Barro Colorado, the largest of these islands, fortunately escaped the devastating hand of the ubiquitous banana planter until 1923 when Governor Morrow wisely insured its permanent preservation by proclaiming it a Natural Park. Soon afterward, through the intervention of Dr. Thomas Barbour, James Zetek, and others, the island was assigned for scientific purposes to the Institute for Research in Tropical America which founded there the Barro Colorado Island Biological Station.

Barro Colorado Island is about three and a half miles long and three miles wide and rises at its highest point about 450 feet above the average level of Gatun Lake. Much of the island, especially on the side on which the Laboratory is located, is very rugged. Many rocky brooks have cut well back into the steep hillsides, forming an intricate system of deep ravines and high ridges. The central and western part of the island, however, is more level and slopes gently down to the lake shore. Except for the clearing immediately about the laboratory

buildings and the small clearing of an old plantation on the other side of the island, a tropical forest covers the whole area. A large part of the forest is characterized by very large trees and is without question a virgin growth. Oven seventeen miles of carefully planned trails make every part of this forest reasonably accessible from the Laboratory, which is beautifully situated high above the lake on the east shore of the island. In the sheltered cove below the Laboratory

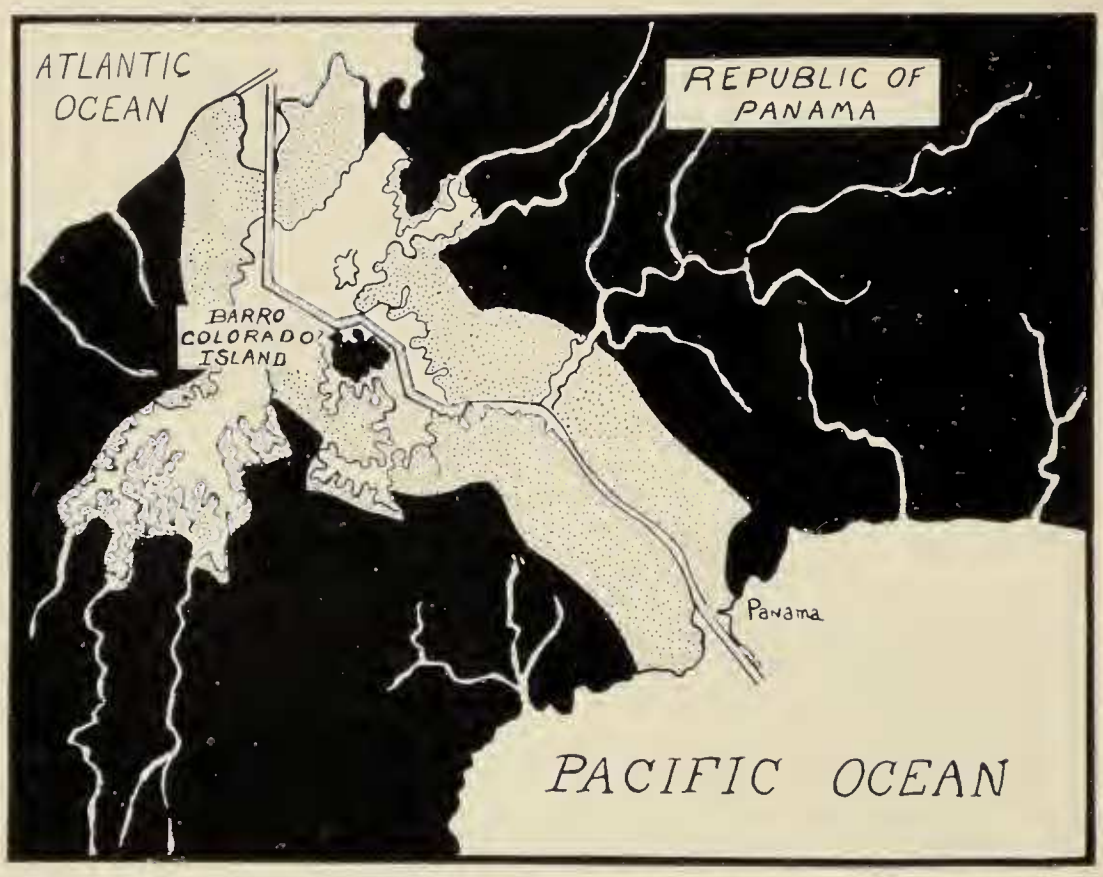

FIGURE 1. Sketch Map of the Canal Zone, Panama, showing Gatun Lake and Barro Colorado Island. Reproduced from the *Scientific Monthly* for May, 1930, by permission from this magazine and the author, Dr. S. W. Frost.

is the dock where visitors and their baggage are landed by the Laboratory launch which brings them from the little railroad station of Frijoles, three miles away across the Canal. Frijoles is almost the midpoint on the Panama Railroad and three trains a day in each direction make all other points in the Canal Zone very easy to reach from the Laboratory.

At the Laboratory the scientist is provided with good board, comfortable sleeping quarters, and a large, well-screened laboratory with spacious tables for any sort of work. There is also at his disposal a good supply of pure water, ice, a dark room, drying closet, and many of the more common chemical reagents and supplies.

FIGURE 2. The laboratory buildings of the Barro Colorado Island Biological Station. (Photo by Walter E. Hastings).

FIGURE 3. Gatun Lake and the Panama Canal as seen from the laboratory. (Photo by Walter E. Hastings).

It is easy to accept such conditions as a matter of course, but the student should realize that they are quite unique. I know of no other place in the American tropics where the biologist can live and work in comfort and safety in a virgin rain-forest jungle.

But I shall not attempt here to describe in detail the facilities of the Laboratory or the environmental conditions in the Panama forest but simply refer the reader to Dr. Gross' (1927) article in the Smithsonian Report and to Dr. Chapman's delightful book (1929) on Barro Colorado. I have personally spent eleven months at the Laboratory and will gladly answer to the best of my ability any inquiries addressed to me concerning Barro Colorado. Those who plan to work at the Laboratory should apply to Dr. Thomas Barbour (Museum of Comparative Zoology, Cambridge, Mass.).

My purpose here is to outline some of the problems awaiting the ornithologist in Panama and to make a few suggestions as to how they may be attacked.

The problem of seasons in Panama is an altogether different one from that which confronts the ornithologist in the North. There is no winter and summer, but instead, a wet season from June to December and a dry season during the other five or six months. But there are usually ten or fifteen inches of rain on Barro Colorado during the dry season, so that it is really a rain forest, although showing a marked tendency toward the monsoon type. The study of the correlation of the nesting time of the various birds with the wet and dry seasons is a most interesting one. We have made only a bare beginning, but apparently some species nest only in the dry season (*Ramphastos*, *Brotogeris*, and *Zarhynchus*) and others only in the wet season (*Myiobius* and *Manacus*) while still others (*Ionornis* and *Leptotila*) seem to nest throughout the year. Studies made there by Dr. Chapman (1928) have already indicated a remarkable exactness in the annual commencement of breeding operations by certain species. As to the factors which govern this we can not as yet even make an intelligent guess.

I ought, perhaps, to mention at this point that no one should hesitate to visit Barro Colorado during the rainy season. Field work in the tropics is customarily discontinued at the beginning of the wet season. But this is ordinarily due to the difficulty of transport and of drying specimens. Neither of these factors need be considered on Barro Colorado. The heavy rainfall comes mainly in short, hard showers in the afternoon and interferes very little with one's work. And the fact that the abundant ticks of the dry season disappear almost entirely with the commencement of the rains is no small argument for

FIGURE 4. The Kingbird (*Tyrannus melancholicus chloronotus*) which nests abundantly in March on Barro Colorado. (Photo by Walter E. Hastings).

FIGURE 5. The nest of a small Flycatcher (*Myiozetetes similis columbianus*) on Barro Colorado. Many birds in Panama build covered nests. (Photo March 17, 1926, by J. Van Tyne).

choosing the wet season. I have worked on the Island during two wet and two dry seasons and I feel that the advantages and disadvantages of the two seasons so exactly balance that I shall time my next visit to the Laboratory solely according to the nesting time (known or guessed) of the species I wish to study.

Other problems are those concerned with the determination of the methods and conditions of breeding peculiar to the tropics. It has long been known that birds lay fewer eggs in the tropics. We found that the Purple Gallinule on Barro Colorado lays but three to four eggs to a set, whereas in the temperate regions to the north the same species lays six to eight. Two eggs was usually the full complement in nests of small perching birds which we found in Panama. In the United States four eggs may be considered the average set for small land birds. In addition our work at Barro Colorado has already shown that in most species studied the period of incubation is surprisingly long. In the case of two Tyrant Flycatchers (*Myiobius a. atricaudus* and *Pipromorpha oleaginea parca*) we found an incubation period of twenty-one and twenty-two days, half again as long as known for any species of the family in temperate regions. The period of nestling life we found equally prolonged.

Life history studies at Barro Colorado will be of two types. Birds of genera or families also found in temperate regions will be studied with the hope that valuable facts may result from a comparison with their northern representatives. And even more interesting results may be expected from studies made of species belonging to exclusively neotropical groups. Of the first type the flycatchers are, perhaps, the best example, but there are many others, such as gallinules, herons, tanagers, and orioles. Of the second type may be mentioned the toucans, antbirds, woodhewers, manakins, and puffbirds.

Most of the supposed difficulties in the way of such work on Barro Colorado do not exist or are readily overcome, but there are certain obstacles against which the ornithologist should be fore-warned if he is to avoid disappointment. Although the avifauna of tropical America is extremely rich in species (from Panama alone there are already recorded over a thousand forms) yet the individuals are not correspondingly abundant. This is a rather serious handicap to life history studies because of the difficulty of finding sufficient material on a single species. But with time, industry, and a little luck even this problem may be solved. Another obstacle we encountered was the high percentage of nests under observation which were destroyed by enemies before the eggs had hatched or the young had left. The per-

FIGURE 6. The nest of the Cassin Dove (*Leptotila cassini*) may be found both in the wet and the dry seasons. Photo, Barro Colorado, March 19, 1927, by Walter E. Hastings).

FIGURE 7. A Turkey Buzzard photographed from the porch of the laboratory. (Photo by J. Van Tyne, March, 1927).

centage was perhaps not much greater than in the north but it was high enough to present a serious problem. An additional difficulty in the way of the newcomer is that of the identification of the birds seen and studied. But this has been largely overcome at Barro Colorado. There is now an excellent illustrated handbook of the birds of this very region (Sturgis, 1928), the *only* book of its sort for the whole American tropics, and there is at the Laboratory a set of identified study skins of most of the species of birds recorded from the Island. Nevertheless, no serious student should expect to work on Barro Colorado without collecting an occasional bird as a final check upon his identifications.

I have mentioned but a few of the problems which have come to my attention in the course of my early work in Panama but they are perhaps sufficient to indicate the wealth of fascinating questions which now await solution in the forests of Barro Colorado.

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Museum of Zoology, University of Michigan.
Ann Arbor, Michigan.